

CLAIMS

1. A quick release mechanism comprising:

5 a tool comprising a drive stud comprising an out-of-round drive portion, an adjacent portion, and a passageway extending obliquely with respect to a longitudinal axis defined by the drive stud between a first end at the drive portion and a second end at the adjacent portion, said out-of-round portion shaped to fit within a tool attachment to apply torque to the tool attachment;

10 a locking element slidably received in the passageway to slide between a tool attachment engaging position and a tool attachment release position;

a coil spring extending around the adjacent portion, said spring comprising a first end coupled with the locking element to bias the locking element to the tool engaging position, and a second end; and

15 a shoulder formed by the adjacent portion and facing the spring, said shoulder forming a transition between a radially outer surface and a radially inner surface, wherein the shoulder is interposed between the radially outer surface and the spring;

20 a ring disposed around the adjacent portion between the second end of the spring and the shoulder;

a collar extending around the spring and the ring;

a second ring extending around the adjacent portion between the locking element and the first end of the spring, said second ring transferring biasing forces from the spring to the locking element;

25 said spring extending farther than said radially outer surface radially away from the longitudinal axis.

2. (Cancelled)

3. A quick release mechanism comprising:

a tool comprising a drive stud comprising an out-of-round drive portion, an adjacent portion, and a passageway extending obliquely with respect to a longitudinal axis defined by the drive stud between a first end at the drive portion and a second end at the adjacent portion, said out-of-round portion
5 shaped to fit within a tool attachment to apply torque to the tool attachment;

a locking element slidably received in the passageway to slide between a tool attachment engaging position and a tool attachment release position;

a coil spring extending around the adjacent portion, said spring
10 comprising a first end coupled with the locking element to bias the locking element to the tool engaging position, and a second end; and

an integral raised stop extending radially outwardly from the adjacent portion of the drive stud;

a collar extending around the spring and the ring;

15 a second ring extending around the adjacent portion between the locking element and the first end of the spring, said second ring transferring biasing forces from the spring to the locking element;

said spring reacting against said raised stop and extending farther than said raised stop radially away from the longitudinal axis.

20 4. (Cancelled)

5. The invention of Claim 1 wherein the ring centers the collar on the tool as the collar moves along the longitudinal direction relative to the drive stud and the ring.

6. (Cancelled)

25 7. The invention of Claim 1 wherein the collar comprises a ledge that engages the second ring on a side of the second ring opposite the spring.

8. The invention of Claim 1 wherein the spring comprises a coiled wire characterized by a wire center, and wherein the wire center extends

farther than said radially outer surface radially away from the longitudinal axis.

5 9. The invention of Claim 1 or 3 further comprising a releasing spring biasing the locking element toward the tool attachment releasing position.

 10. The invention of Claim 1 wherein the second end of the spring bears directly on the ring, and wherein the ring bears directly on the shoulder.

 11. The invention of Claim 1 wherein the ring is symmetrical about a mid-plane oriented transverse to the longitudinal axis.

10 12. The invention of Claim 1 wherein the spring defines an inner spring diameter and an outer spring diameter adjacent the shoulder, wherein the radially outer surface defines a surface diameter adjacent the spring, and wherein the surface diameter is greater than the inner spring diameter and less than the outer spring diameter.

15 13. The invention of Claim 3 wherein the spring defines an inner spring diameter and an outer spring diameter adjacent the raised stop, wherein the raised stop defines a stop diameter adjacent the spring, and wherein the stop diameter is greater than the inner spring diameter and less than the outer spring diameter.

20 14. The invention of Claim 3 wherein the raised stop comprises a shoulder.

 15. The invention of Claim 3 wherein the raised stop comprises an upset portion of the drive stud.

25 16. The invention of Claim 3 wherein the raised stop comprises an element secured to the drive stud.

 17. The invention of Claim 16 wherein the element comprises a material selected from the group consisting of metals and epoxies.

18. A quick release mechanism comprising:

5 a tool comprising a drive stud comprising an out-of-round drive portion, an adjacent portion, and a passageway extending obliquely with respect to a longitudinal axis defined by the drive stud between a first end at the drive portion and a second end at the adjacent portion, said out-of-round portion shaped to fit within a tool attachment to apply torque to the tool attachment;

10 a locking element slidably received in the passageway to slide between a tool attachment engaging position and a tool attachment release position; and

a coil spring extending around the adjacent portion, said spring comprising a first end coupled with the locking element to bias the locking element to the tool engaging position, and a second end;

15 wherein the locking element comprises a first end shaped to engage the tool attachment, an intermediate portion, and a second end, wherein the second end comprises a smaller diameter than a diameter of the intermediate portion.

19. The invention of claim 18 further comprising:

20 an integral raised stop extending radially outwardly from the adjacent portion of the drive stud;

a collar extending around the spring and the ring;

25 a second ring extending around the adjacent portion between the locking element and the first end of the spring, said second ring transferring biasing forces from the spring to the locking element.